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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,083	10/15/2003	Narayan Sundararajan	42P13833D	7275
7590 03/12/2007 Raj S. Dave Morrison & Foerster LLP Suite 300 1650 Tysons Blvd. McLean, VA 22102			EXAMINER FORMAN, BETTY J	
			ART UNIT 1634	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/686,083		SUNDARARAJAN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	BJ Forman		1634	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 December 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5-8 and 10-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-8 and 10-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

Art Unit: 1634

### **DETAILED ACTION**

#### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 13 December 2006 has been entered.

#### ***Status of the Claims***

2. This action is in response to papers filed 13 December 2006 in which claims 1, 7, 8, 16, 19 were amended and claims 3-4 were canceled. The amendments have been thoroughly reviewed and entered.

The previous objections and rejections in the Office Action dated 15 August 2006, not reiterated below, are withdrawn in view of the amendments. Applicant's arguments have been thoroughly reviewed but are deemed moot in view of the amendments, withdrawn rejections and new grounds for rejection. New grounds for rejection are discussed.

Claims 1-2, 5-8, 10-22 are under prosecution.

#### ***Specification***

3. The disclosure is objected to because it contains, at least on page 6, embedded hyperlinks and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1634

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-2, 5-8 and 10-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al (WO 99/57321, published 11 November 1999) and Baller et al (WO 01/33226, published 10 May 2001).

Regarding Claim 1, Williams et al disclose an apparatus comprising a analysis chamber comprising one or more double stranded nucleic acids (primer/template hybrid) wherein the nucleic acids are covalently attached to a support (page 11, lines 22-29) wherein the chamber is responsive to the addition of labeled nucleotides, the apparatus further comprising one or more reagent reservoirs in fluid communication with the chamber, a detection unit operably coupled to the chamber and a data processing and control unit "operably coupled" to the chamber, reservoirs and detection unit and further comprising a polymerase within the chamber (Claims 27-42 and page 7, lines 6-13 and pages 8-11). Williams further teach the apparatus is configured to detect thermal properties of the primer extension reaction (page 9, lines 26-28) and further teach detection of primer extension using a cantilever device and mass labels (i.e. AFM, page 22, line 30-page 23, line 16) but they are silent regarding the nucleic acids being attached to a cantilever substrate.

However, cantilevers configured for detection of thermal properties and bearing covalently attached nucleic acids were well known in the art at the time the claimed invention was made as taught by Baller et al (page 9, lines 9-12).

Baller et al disclose a similar apparatus comprising a analysis chamber (Fig. 8) containing one or more cantilevers (#102) each comprising one or more covalently attached nucleic acid templates (thiol modified DNA attached to gold-coated cantilever, page 13, lines 9-15) wherein the cantilevers are responsive to deflection produced by changes in mass (i.e. addition of complementary sequence adds mass to the cantilever and causes deflection, page

Art Unit: 1634

13, lines 1-20), one or more reagent reservoirs in fluid communication with the chamber (i.e. input #112/output #113, Fig. 8), a detection unit operably coupled to the cantilever (PSD, #108) and a data processing and control unit "operably coupled" to the chamber, reservoirs and detection unit (PC #111, Fig. 8).

Baller et al further teach that detection of support-immobilized molecules using AMF have numerous disadvantages e.g. results are difficult to reproduce, strong dependence on and sensitivity to environmental parameters (page 1, lines 18-22) Baller et al further teach that cantilever-immobilized molecules do not suffer the same disadvantages due to the advantages provided by the cantilever e.g. reliable recognition of molecules and reliable detection of properties in various environments (page 1, lines 23-26) thereby providing a very sensitive system with fast responses, suitable for mass production and re-use (page 4, lines 15-18).

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the cantilever support of Baller et al to the apparatus of Williams. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success based on the teaching of Baller et al and for the advantages of cantilevers taught by Baller e.g. reliable recognition of molecules and reliable detection of properties in various environments (page 1, lines 23-26) thereby providing a very sensitive system with fast responses, suitable for mass production and re-use (page 4, lines 15-18).

Alternatively, It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the apparatus of Baller et al by adding the polymerase as taught by Williams. One of ordinary skill in the art would have been motivated to do so for the expected benefit of "extremely accurate" determination of DNA sequence while eliminating the need for electrophoretic separation (page 5, lines 4-14 and page 7, lines 1-5).

Regarding Claim 2, Williams et al disclose the apparatus wherein the template is between 10 and 100,000 bases (Example 1, page 24) and Baller et al disclose the apparatus

Art Unit: 1634

wherein the nucleic acids are about 10 nucleotides in length (e.g. 12 and 16 mer, page 12, lines 18-23).

Regarding Claim 5, Baller et al disclose the apparatus wherein the detection unit comprises a piezoresistor (page 7, lines 15-22).

Regarding Claim 6, Williams et al disclose the apparatus wherein the detection unit comprises a laser (page 17, line 26) and Baller et al disclose the apparatus wherein the detection unit comprises a laser (page 7, lines 23-25).

Regarding Claim 7, Baller et al disclose the apparatus wherein the detection unit detects deflection of the cantilever (page 12, lines 12-17).

Regarding Claim 8, Baller et al disclose an apparatus comprising a analysis chamber (Fig. 8) containing one or more cantilevers (#102) each comprising one or more covalently attached nucleic acid templates (thiol modified DNA attached to gold-coated cantilever, page 13, lines 9-15) wherein the cantilevers are responsive to deflection produced by changes in mass (i.e. addition of complementary sequence adds mass to the cantilever and causes deflection, page 13, lines 1-20), a detection unit operably coupled to the cantilever (PSD, #108) and a data processing and control unit "operably coupled" to the chamber, reservoirs and detection unit (PC #111, Fig. 8).

Baller et al further teach that detection of support-immobilized molecules using AMF have numerous disadvantages e.g. results are difficult to reproduce, strong dependence on and sensitivity to environmental parameters (page 1, lines 18-22) Baller et al further teach that cantilever-immobilized molecules do not suffer the same disadvantages due to the advantages provided by the cantilever e.g. reliable recognition of molecules and reliable detection of properties in various environments (page 1, lines 23-26) thereby providing a very sensitive system with fast responses, suitable for mass production and re-use (page 4, lines 15-18).

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the cantilever support of Baller et al to the apparatus of Williams.



Art Unit: 1634

One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success based on the teaching of Baller et al and for the advantages of cantilevers taught by Baller e.g. reliable recognition of molecules and reliable detection of properties in various environments (page 1, lines 23-26) thereby providing a very sensitive system with fast responses, suitable for mass production and re-use (page 4, lines 15-18).

Alternatively, It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the apparatus of Baller et al by adding the polymerase as taught by Williams. One of ordinary skill in the art would have been motivated to do so for the expected benefit of “extremely accurate” determination of DNA sequence while eliminating the need for electrophoretic separation (page 5, lines 4-14 and page 7, lines 1-5).

Regarding Claim 10, Baller et al disclose the apparatus wherein the data processing and control unit is a computer (PC #111, Fig. 8).

Regarding Claim 11, Baller et al disclose the apparatus wherein the detection unit comprises a laser and a position sensitive photo detector (page 15, line 28-page 16, line 1).

Regarding Claim 12, Baller et al disclose the apparatus wherein the detection unit comprises a piezoresistor (page 7, lines 15-22).

Regarding Claim 13, Williams et al disclose the apparatus wherein the template is between 10 and 100,000 bases (Example 1, page 24) and Baller et al disclose the apparatus wherein the nucleic acids are about 10 nucleotides in length (e.g. 12 and 16 mer, page 12, lines 18-23).

Regarding Claim 14, Baller et al disclose the apparatus further comprising an array of cantilevers (#102) wherein each cantilever is “associated with the same molecule”.

The claims are given the broadest reasonable interpretation consistent with the broad claim language and specification wherein “associated with” is not defined. The apparatus of Baller has an array of cantilevers within a liquid cell having an inlet for fluid flow into the cell.

Art Unit: 1634

The cell is used e.g. hybridization. Any molecule (e.g. buffer molecules) put into the cell via the inlet would be "associated with" each cantilever as claimed.

The courts have stated that claims must be given their broadest reasonable interpretation consistent with the specification *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997); *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969); and *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (see MPEP 2111).

Regarding Claim 15, Baller et al disclose the apparatus further comprising an array of cantilevers (#102) wherein each cantilever is "associated with a different molecule" i.e. have different affinities for a target (page 8, lines 24-27; page 11, lines 14-20; and page 12, lines 18-23).

Regarding Claim 16, Baller et al disclose an apparatus comprising a analysis chamber (Fig. 8) containing one or more cantilevers (#102) each comprising one or more covalently attached nucleic acid templates (thiol modified DNA attached to gold-coated cantilever, page 13, lines 9-15) wherein the cantilevers are responsive to deflection produced by changes in mass (i.e. addition of complementary sequence adds mass to the cantilever and causes deflection, page 13, lines 1-20), a piezoresistor embedded at the fixed end of the cantilever (page 7, lines 15-22), a detection unit "operably coupled" to the piezoresistor to detect deflection (page 7, lines 15-22) and a data processing and control unit "operably coupled" to the chamber, reservoirs and detection unit (PC #111, Fig. 8).

Baller et al further teach that detection of support-immobilized molecules using AMF have numerous disadvantages e.g. results are difficult to reproduce, strong dependence on and sensitivity to environmental parameters (page 1, lines 18-22) Baller et al further teach that cantilever-immobilized molecules do not suffer the same disadvantages due to the advantages provided by the cantilever e.g. reliable recognition of molecules and reliable detection of



Art Unit: 1634

properties in various environments (page 1, lines 23-26) thereby providing a very sensitive system with fast responses, suitable for mass production and re-use (page 4, lines 15-18).

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the cantilever support of Baller et al to the apparatus of Williams. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success based on the teaching of Baller et al and for the advantages of cantilevers taught by Baller e.g. reliable recognition of molecules and reliable detection of properties in various environments (page 1, lines 23-26) thereby providing a very sensitive system with fast responses, suitable for mass production and re-use (page 4, lines 15-18).

Alternatively, It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the apparatus of Baller et al by adding the polymerase as taught by Williams. One of ordinary skill in the art would have been motivated to do so for the expected benefit of "extremely accurate" determination of DNA sequence while eliminating the need for electrophoretic separation (page 5, lines 4-14 and page 7, lines 1-5).

Regarding Claim 17, Williams et al disclose the apparatus further comprising a resistance measuring device (page 17, lines 13-16) and Baller et al disclose the apparatus further comprising a resistance measuring device (page 7, line 18).

Regarding Claim 18, Williams et al disclose the apparatus wherein the template is between 10 and 100,000 bases (Example 1, page 24) and Baller et al disclose the apparatus wherein the nucleic acids are about 10 nucleotides in length (e.g. 12 and 16 mer, page 12, lines 18-23).

Regarding Claim 19, Baller et al disclose an apparatus comprising a analysis chamber (Fig. 8) containing one or more cantilevers (#102) coated with a substance (e.g. gold layer, page 13, lines 13-15) each comprising one or more covalently attached nucleic acid templates (thiol modified DNA attached to gold-coated cantilever, page 13, lines 9-15) wherein the cantilevers are responsive to deflection produced by changes in mass (i.e. addition of complementary

Art Unit: 1634

sequence adds mass to the cantilever and causes deflection, page 13, lines 1-20) a detection unit operably coupled to the cantilever (PSD, #108) and a data processing and control unit “operably coupled” to the chamber, reservoirs and detection unit (PC #111, Fig. 8).

Baller et al disclose the apparatus wherein the cantilevers function to detect biomolecule binding (page 9, lines 22-24) and are useful for determining base sequence analysis (page 13, lines 22-25) but they are silent regarding addition of polymerase to the analysis chamber.

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the cantilever support of Baller et al to the apparatus of Williams. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success based on the teaching of Baller et al and for the advantages of cantilevers taught by Baller e.g. reliable recognition of molecules and reliable detection of properties in various environments (page 1, lines 23-26) thereby providing a very sensitive system with fast responses, suitable for mass production and re-use (page 4, lines 15-18).

Alternatively, It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the apparatus of Baller et al by adding the polymerase as taught by Williams. One of ordinary skill in the art would have been motivated to do so for the expected benefit of “extremely accurate” determination of DNA sequence while eliminating the need for electrophoretic separation (page 5, lines 4-14 and page 7, lines 1-5).

Regarding Claim 20-21, Baller et al disclose the substance is an alloy e.g. gold (page 13, lines 9-15).

Regarding Claim 22, Baller disclose the apparatus wherein the nucleic acids are coupled to the cantilever through a thiol group (page 13, lines 9-15).

Art Unit: 1634

**Double Patenting**

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-2, 5-8, 10-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15-17, 19-20, 29-30, 34-37, 42-52 of copending Application No. 10/254,201 in view of Lindsay et al (U.S. Patent No. 5,750,989).

Although the conflicting claims are not identical, they are not patentably distinct from each other because both sets of claims are drawn to an apparatus comprising cantilever structures, detection unit and data processing/control unit. The claim sets merely differ in that the instant claims define the cantilever as part of an analysis chamber. While the '083 claims do not require a chamber, cantilevers chambers were well known and routinely practiced in the art at the time the claimed invention was made as taught by Lindsay et al who teach that the chamber permits sample analysis within a controlled environment (Column 4, lines 12-34). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the chamber of Lindsay et al to the '083 apparatus for the expected benefit of environmentally controlled sample analysis as desired in the art (Lindsay et

Art Unit: 1634

al, Column 4, lines 12-34). The claim sets further differ in that the '201 claims require a dielectric sphere, laser and objective lens. However, the instant claim language "comprising" encompasses the additional elements recited in the '201 claims. For these reasons, the claim sets are not patentably distinct.

This is a provisional obviousness-type double patenting rejection.

#### **Response to Arguments**

8. Applicant has provided no arguments regarding the above rejection. The rejection is maintained.

9. Claims 1-2, 5-8 and 10-22 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 24-46 of copending Application No. 10/705,389 as evidenced by Fritz et al (Science, 2000, 288: 316-318). Although the conflicting claims are not identical, they are not patentably distinct from each other because both sets of claims are drawn to an apparatus comprising cantilever structures, detection unit and data processing/control unit. The claim sets merely differ in the arrangement of limitations within the claim sets and terminology used to define some elements. For example, the instant claims define the nucleic acids as being covalently attached to the cantilever while the '389 claims define the nucleic acid as being attached via a thiol group to a gold surface (e.g. Claims 44-45). Fritz et al define the thiol-gold attachment as covalent (page 318, right column ¶ 15). Therefore, the instantly claimed apparatus and that of the '389 claim set are not patentably distinct.

#### **Response to Arguments**

10. Applicant has not traversed the above rejection. The rejection is maintained.

Art Unit: 1634

**Conclusion**

11. No claim is allowed.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BJ Forman whose telephone number is (571) 272-0741. The examiner can normally be reached on 6:00 TO 3:30.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to (571) 272-0547.

Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now contact the USPTO's Patent Electronic Business Center (Patent EBC) for assistance. Representatives are available to answer your questions daily from 6 am to midnight (EST). The toll free number is (866) 217-9197. When calling please have your application serial or patent number, the type of document you are having an image problem with, the number of pages and the specific nature of the problem. The Patent Electronic Business Center will notify applicants of the resolution of the problem within 5-7 business days. Applicants can also check PAIR to confirm that the problem has been corrected. The USPTO's Patent Electronic Business Center is a complete service center supporting all patent business on the Internet. The USPTO's PAIR system provides Internet-based access to patent application status and history information. It also enables applicants to view the scanned images of their own application file folder(s) as well as general patent information available to the public.

For all other customer support, please call the USPTO Call Center (UCC) at 800-786-9199.

  
BJ Forman, Ph.D.  
Primary Examiner  
Art Unit: 1634  
March 6, 2007